

# The ICF3D Code

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## Abstract

ICF3D is a 3D plasma simulation computer code being developed in X Division. It is portable, unclassified, and runs on a variety of platforms: uniprocessors, SMPs, and MPPs. It parallelizes by decomposing physical space into nearly disjoint subdomains and relies on explicit calls to message passing routines in libraries such as MPI. ICF3D is written in the object oriented programming language C++. Its mesh is unstructured. Physical space is discretized by finite elements, a collection of hexahedra, prisms, pyramids, and tetrahedra. The hydrodynamics is modeled by the discontinuous finite element method. This allows a natural representation of inherently discontinuous phenomena, e.g., shocks. Continuous processes such as diffusion are modeled by standard finite element methods. ICF3D consists of separate equation-of-state, hydrodynamic, heat conduction, and multi-group radiation transport (diffusion approximation) packages. In this paper, we present a general overview of the code, its modules, and present results on problems relevant to ICF. Results are obtained on a variety of computers including the LLNL 256 node Cray T3D. We also present scaling results to demonstrate the efficacy of the parallelization.

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